Overview

• We have investigated the following comment and propose our remedy in this presentation.

  • Comment about neglecting $\varepsilon$
    • [802.1 - 14985] [Qdq] Some Thoughts on Equation (X-5)
Some Thoughts on Equation (X-5)

As indicated in one of my comments and discussed during comment resolution, (X-5) at this point does not give very good guidance to the user of this document. I have done some playing around and would want to hear your thoughts on it:

I use the following nomenclature, trying to stay close to the document draft:

- B ... BlockData size (different from text)
- D ... DataSize (different from text!)
- n ... number of Frames per cluster
  (I stick with Frame for now, although I think Packet would be better to use!)
- F ... FrameLength
- RM ... RequiredMinimumShapingRate
- BL ... BoundedLatency
- AL ... AccumulatedLatency
Some Thoughts on Equation (X-5) (Cont.)

If we use
\[ D = F \cdot n \] (a simplification of (X-1)),
then Epsilon (\( \epsilon \)) in (X-5) actually becomes:
\[ \epsilon = \frac{1}{n} \cdot \frac{F}{(BL - AL)} \]

Quantifying the fragmentation overhead of line 3 page 24 as
B ... fragmentation overhead per Frame
we can expand:
\[ D = B + O \cdot n \]
and (X-5) can be expressed as:
\[ RM = \left( \frac{B + O \cdot n}{BL - AL} \right) \cdot (1 - \frac{1}{n}) \]
\[ = \left( \frac{F \cdot n}{BL - AL} \right) \cdot (1 - \frac{1}{n}) \]

If we look at (V-8) or (V-10) of IEEE Std 802.1Q-RevD1.0 or (6-1) of IEEE Std 802.1BA-2021, it is a good assumption that AccumulatedLatency in the network actually will depend on FrameLength, so you likely do not get to pick these parameters (F and n) independently (for a given B).

Assuming AL was determined for a MaximumFrameSize FM, we get:
\[ D = (B + O \cdot n) = FM \cdot n \]
and
\[ RM = \left( \frac{FM \cdot n}{BL - AL} \right) \cdot (1 - \frac{1}{n}) \]

If we arbitrarily choose the error introduced by neglecting \( \epsilon' = \frac{1}{n} \) to be:
\[ \epsilon' < 1\% \], then
\[ n > 100 \]
and therefore
\[ B > 100 \cdot (FM - O) \]

Is it worthwhile to give this or a similar criterion to the reader?
Response to the commenter

• We agree with the commenter that there is the case $\varepsilon$ is too large to be neglected.

• Application developers can take advantage that neglecting $\varepsilon$ enables the whole of the BlockData to reach the Listener within the bounded latency regardless of the position of the reference points.

• Therefore, we define $\varepsilon$ in detail and then transform Equation (X-4) to Equation (X-5) by using this definition.

• Since the derived variable “RequiredMinimumShapingRate” includes such kind of design decisions, the equations from Equation (X-9) onward are changed to equations using this variable.
Proposed remedy 1

- Change Page 27 Line 1 and 2 to:

\[\text{DataSize}(i) \text{ is much larger than the length of the last frame (i.e. FrameLength}(i_{\text{worst}}))\], therefore \(\text{RequiredMinimumShapingRate}\) can be simplified by introducing a small positive value \(\varepsilon\) as follows; Letting \(\text{FrameLength}(i_{\text{worst}}, n_{i_{\text{worst}}})/(\text{BoundedLatency} - \text{AccumulatedLatency})\) denote as \(\varepsilon\), Equation (X-4) is transformed as follows;
Proposed remedy 2

• Change after Page 27 Line 4:

\(\varepsilon\) can be zero in actual implementations. Neglecting \(\varepsilon\) makes \text{RequestedMinimumShapingRate} larger, therefore the reference of the last frame reaches earlier than configured by bounded latency. Especially, in order to neglect \(\varepsilon\) completely, that is, as zero, in case that an application developer requests to assure bounded latency until the last bit of \text{BlockData} delivers, consider the \((n+1)\)th frame and its reference point that are imaginary.

• Insert after Page 27 Line 10 (Equation X-6)

Equation (X-6) is equivalent to Equation (X-5) where \(\varepsilon\) is zero. This enables the whole of the \text{BlockData} to reach the Listener within the bounded latency regardless of the position of the reference points.
Proposed remedy 3

X.4.3 Equation X-9

\[
\text{CommittedInformationRate} = \frac{\text{MaximumDataSize}}{\text{BoundedLatency} - \text{AccumulatedLatency}}
\]  \hspace{1cm} (X-9)

changes to

\[
\text{CommittedInformationRate} = \text{RequiredMinimumShapingRate}
\]
Proposed remedy 4

X.4.4 Equation from (X-10) to (X-13) includes fraction for instance,

\[
\text{MaxIntervalFrames} = \left[ \frac{1}{\text{MaxFrameSize}} \cdot \frac{\text{MaximumDataSize}}{\text{BoundedLatency} - \text{AccumulatedLatency}} \cdot \text{classMeasurementInterval} \right]
\]

- This fraction is changed to “RequiredMinimumShapingRate”
Summary

• We answered the comment about neglecting $\varepsilon$.
• In some case, $\varepsilon$ is too large to be neglected.
• On the other hand, neglecting $\varepsilon$ has an advantage for application developers.
• Therefore, we defined $\varepsilon$ properly and changed the related sentences and equations.